

# Electronic Metering Pumps



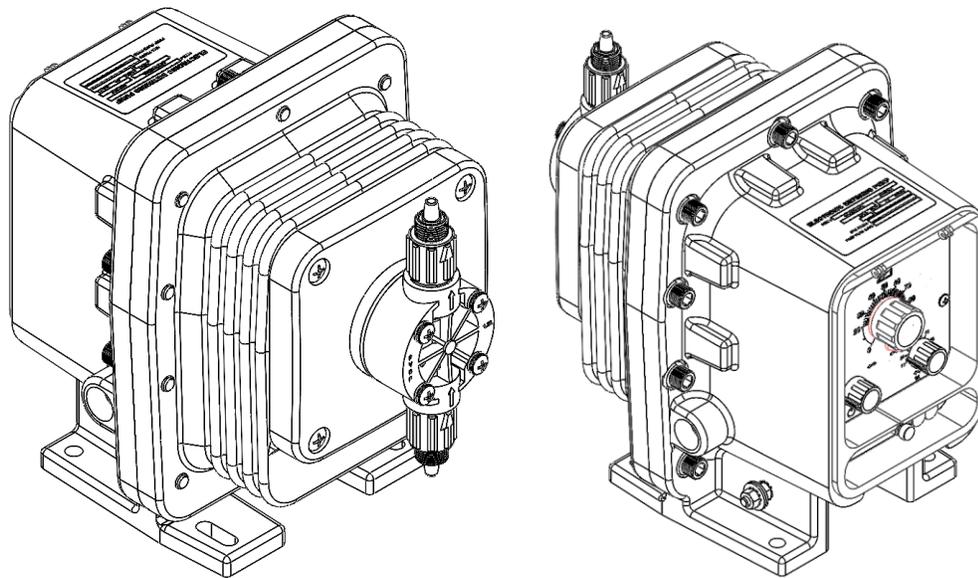
Class I, Div. 1 Groups C & D  
Class I, Zone 1, Group IIB T5

**Installation**

**Operation**

**Maintenance**

**Instruction**



Tested and Certified by WQA  
against NSF/ANSI/CAN 61



**READ ALL WARNINGS  
CAREFULLY  
BEFORE  
INSTALLING**



<sup>1</sup>PVDF and Degassing Head Pumps  
See [www.wqa.org](http://www.wqa.org) for certification  
parameters

# Table of Contents

1	Product SAFETY.....	4
1.1	DEFINITIONS.....	4
1.2	EXPLOSIVE ATMOSPHERE SAFETY.....	5
1.3	GENERAL SAFETY.....	5
1.4	INSTALLATION/OPERATION Safety.....	6
1.5	FIRE SAFETY.....	8
1.6	LIABILITY EXCLUSION.....	8
1.7	SUITABILITY TO SITE OF INSTALLATION.....	9
1.8	NAMEPLATE AND MARKING.....	11
1.9	TRANSPORT AND STORAGE.....	11
1.10	CONSIGNMENT RECEIPT AND UNPACKING.....	11
1.11	HANDLING.....	11
1.12	LIFTING.....	11
1.13	RECYCLING AND END OF PRODUCT LIFE.....	11
2	STORAGE INSTRUCTIONS.....	12
2.1	SHORT TERM (0 - 12 MONTHS).....	12
2.2	LONG TERM (12 MONTHS OR MORE).....	12
3	UNPACKING THE PUMP.....	12
4	OPERATION.....	12
4.1	PRINCIPLE OF OPERATION.....	12
4.2	MATERIALS OF CONSTRUCTION.....	13
5	INSTALLATION.....	13
5.1	LOCATION.....	13
5.2	PUMP MOUNTING.....	14
5.3	PUMP PREPARATION.....	14
5.4	PIPING.....	15
5.5	INTEGRITY OF THE ENCLOSURE.....	16
5.6	ELECTRICAL WIRING.....	16
5.6.1	CODES AND REGULATIONS.....	17
5.6.2	POWER.....	17
5.6.3	SIGNAL INPUT WIRING.....	18
5.6.4	GROUNDING.....	19
5.6.5	INSTALLATION GUIDELINES FOR EMC COMPLIANCE.....	19
6	OPERATION AND STARTUP.....	20
6.1	PUMP CONTROL PANEL.....	20
6.2	OPERATING MODE.....	20
6.3	STROKE RATE ADJUSTMENT.....	20
6.4	STROKE length ADJUSTMENT.....	20
6.5	PRE-STARTUP CHECKLIST.....	21
6.6	PRIMING.....	21
6.7	CAPACITY CONTROL.....	22
6.8	MANUAL FLOW RATE SETTING.....	22

6.9	OPERATION BY EXTERNAL INPUT SIGNAL .....	23
6.10	STOP FUNCTION (ALL MODELS).....	23
6.11	EXTERNAL PACING FUNCTION (PUMP MODEL STRING XP __ E).....	23
6.12	4-20mA DC INPUT FUNCTION (PUMP MODEL STRING XP __ M).....	24
7	MAINTENANCE.....	24
7.1	OPERATING PRECAUTIONS .....	25
7.2	CLEANING AND DECONTAMINATION.....	25
7.3	USER REPLACEABLE PARTS FOR THE PULSATRON X.....	25
7.4	ROUTINE MAINTENANCE.....	25
8	DISASSEMBLY / RE-ASSEMBLY.....	26
8.1	DIAPHRAGM REMOVAL.....	26
8.2	DIAPHRAGM REPLACEMENT .....	26
8.3	VALVE REPLACEMENT.....	27
8.4	FUSE REPLACEMENT.....	27
9	TROUBLESHOOTING.....	29
10	POLICIES AND PROCEDURES .....	31
10.1	MANUFACTURER'S LIMITED PRODUCT WARRANTY .....	31
10.2	RETURNS.....	32
10.3	CREDITS.....	32

# 1 PRODUCT SAFETY



When using chemical feed pumps, you should always follow all safety precautions to reduce risk of explosion, fire, electric shock, and personal injury. Failure to follow these instructions could result in death or severe injury.



*Lorsque vous utilisez des pompes d'alimentation en produits chimiques, vous devez toujours suivre toutes les précautions de sécurité pour réduire les risques d'explosion, d'incendie, de choc électrique et de blessure. Le non-respect de ces instructions peut entraîner des blessures graves, voire mortelles.*

## 1.1 DEFINITIONS



WARNING

A WARNING DEFINES A CONDITION THAT COULD CAUSE DAMAGE TO BOTH THE PRODUCT AND THE PERSONNEL OPERATING IT. THIS MANUAL MUST BE CONSULTED IN ALL CASES WHERE THE WARNING SYMBOL IS MARKED IN ORDER TO FIND OUT THE NATURE OF THE POTENTIAL HAZARDS AND ANY ACTIONS, WHICH HAVE TO BE TAKEN TO AVOID THEM.



A CAUTION DEFINES A CONDITION WHERE THERE IS THE POTENTIAL FOR ELECTRIC SHOCK.



NOTE

NOTES ARE GENERAL INFORMATION MEANT TO MAKE OPERATING THE PRODUCT EASIER.



TIP

TIPS HELP THE OPERATOR RUN THE PRODUCT IN THE MOST EFFICIENT MANNER POSSIBLE. THESE "TIPS" ARE DRAWN FROM THE KNOWLEDGE AND EXPERIENCE OF OUR STAFF OF ENGINEERS, AND INPUT FROM THE FIELD.

## **IMPORTANT - READ ALL INSTRUCTIONS**

Read all instructions regarding the installation, operation, maintenance and troubleshooting procedures detailed in this Manual to ensure the optimum performance, safety, and service of your unit.

This manual applies to the operation, use and maintenance of the Pulsatron Diaphragm Metering Pump, together with all components, accessories and provided in the original packaging (the "Product"). This consists of the following items:

- PulsatronX Diaphragm Metering Pump (aka PulsatronX): Including the Enclosure, Controls, and Power Module.
- Replaceable Wear Items (aka KOPkit): Including the Pump Head, Diaphragm, Check valves, and Fittings for connection to pipe/tubing
- Accessories: Including the Suction and Discharge Tubing, Bleed Valve Assembly, Foot Valve Assembly, and Injection Quill Assembly.

## 1.2 EXPLOSIVE ATMOSPHERE SAFETY

### RISK OF ELECTRICAL SHOCK



**EXPLOSION HAZARD -- REVIEW THIS ENTIRE MANUAL THOROUGHLY BEFORE PROCEEDING. DO NOT PERFORM INSTALLATION, OR MAINTENANCE OF ANY KIND ON THIS PRODUCT WHILE CIRCUIT IS LIVE AND THE AREA IS KNOWN TO BE HAZARDOUS. OPENING THE ENCLOSURE IS NOT REQUIRED.**

*RISQUE D'EXPLOSION -- ÉTUDIEZ ATTENTIVEMENT CE MANUEL AVANT DE CONTINUER. N'EFFECTUEZ AUCUNE INSTALLATION OU MAINTENANCE DE QUELQUE NATURE QUE CE SOIT SUR CE PRODUIT LORSQUE LE CIRCUIT EST SOUS TENSION ET QUE LA ZONE EST CONSIDÉRÉE COMME DANGEREUSE. IL N'EST PAS NÉCESSAIRE D'OUVRIER L'ENCEINTE.*

Under expected operating conditions, and with the proper marking, the PulsatronX is suitable for use in:

- A. Class I, Division 1, Groups C & D T5
- B. Class I, Zone 1, Group IIB T5
- C. Non-hazardous locations



## 1.3 GENERAL SAFETY



**WARNING:** Only install and use this Product in Classified Hazardous Locations that are compliant with the markings on the Nameplate. All related system components must carry similar or better ratings. If uncertain, consult a Hazardous Location expert. Improper Application and Use can be Hazardous. You are responsible for Safe use!

**AVERTISSEMENT :** *Installez et utilisez ce produit uniquement dans des emplacements dangereux classés conformes aux marquages de la plaque signalétique. Tous les composants connexes du système doivent présenter des valeurs nominales similaires ou supérieures. En cas de doute, consultez un expert en zones dangereuses. Une application et une utilisation inappropriées peuvent être dangereuses. Vous êtes responsable d'assurer une utilisation sûre!*

**Always wear protective clothing, eye protection and gloves before working on, near or around chemical injection system.** Inspect pipe/tubing/pump regularly when replenishing chemical supply. Regular maintenance of the system is required for safe operation.

**The Product is rated for indoor and outdoor use. The Product should be installed where ambient temperatures do not exceed 50C (122F) or fall below 0C (32F). To maintain the Pump Hazardous Location rating (i.e., T-Code) do not operate in direct sunlight.**

**Use pipe/tubing that satisfy the requirements of the site Classified Location and environmental conditions when operating outdoors.**

- Follow directions and warnings provided with the chemicals from the chemical manufacturer. User is responsible for determining chemical compatibility with the chemical feed pump and related system components.
- **WARNING: Risk of Electrical Shock!** The Electrical Installation must confirm to all relevant Local, State and National Electrical Codes. A qualified Electrician must perform Installation/Maintenance. Before Installing or Servicing this device, all power must be disconnected from the source. Make sure the voltage on the chemical metering pump matches the voltage at the installation site. Attach the grounding conductor (identified by labeling and color-coded Green with a Yellow stripe) to a properly grounded circuit. Assure supply ratings conform to the data on the pump data plate. When required install secondary grounding to stud provided (see later section).



**AVERTISSEMENT : Risque de choc électrique! L'installation électrique doit être conforme à tous les codes électriques locaux, régionaux et nationaux pertinents. Un électricien qualifié doit effectuer l'installation/la maintenance. Avant d'installer ou de réparer cet appareil, toute l'alimentation doit être coupée de la source. Assurez-vous que la tension de la pompe doseuse de produits chimiques correspond à la tension du site d'installation. Fixez le conducteur de mise à la terre (identifié par une étiquette et un code couleur vert avec bande jaune) à un circuit correctement mis à la terre. Assurez-vous que les valeurs nominales de l'alimentation sont conformes aux données figurant sur la plaque signalétique de la pompe. Si nécessaire, installez une mise à la terre secondaire sur le goujon fourni (voir section ultérieure).**

- **For Industrial Applications Only! The pump emits Electro-Magnetic Energy and may generate Radio Frequency Interference.**
- **CAUTION! Secure chemicals and metering pumps, making them inaccessible to children and pets.**
- **Pump is NOT rated to handle or meter flammable liquids or materials.**

## 1.4 INSTALLATION/OPERATION SAFETY

Each Electronic Metering Pump has been tested to meet prescribed specifications and safety standards. Proper care in handling, installation and operation will help in ensuring a trouble-free installation. Please read all these cautionary notes prior to installation and start-up of your metering pump. **Failure to follow these instructions could result in serious personal injuries including death, property damage and/or damage to the unit.**

### HANDLING AND INSTALLATION



**Important: Pump must be installed and used with a back pressure/injection valve. Failure to do so could result in excessive pump output and may lead to serious bodily injury and/or damage to the unit.**

*Important : La pompe doit être installée et utilisée avec un régulateur de pression/robinet d'injection. Le non-respect de cette consigne peut entraîner un débit excessif de la pompe et entraîner des blessures graves et/ou des dommages à l'unité.*

Handle the pump with care. Dropping or heavy impact may cause external damage to the pump and to flame paths and electrical parts inside.

Install the pump in a place where the ambient temperature is between 32°F (0°C) and 122°F (50°C).

Install the pump in a place convenient for its future maintenance and inspection and secure it to prevent vibration and movement during operation.

The pump is water resistant and dust proof by construction and can be use outdoors, however, **do not operate the pump submerged.**

Clean pump with a **DAMP CLOTH** to reduce the possibility of **STATIC BUILDUP** on coated surfaces.



**The ribbed Power Module housing, head and pump housing may be hot to touch > 160°F (70°C).**

*Le boîtier nervuré du module d'alimentation, la tête et le carter de la pompe peuvent être chauds au toucher > 70 °C (160 °F).*

Protective caps must be removed prior to installing tubing onto valve assemblies. Use tubing of specified size. When compression tubing fittings are supplied, the tubing must be fully engaged with the barb (the end must touch the shoulder), the compression ring threads must engage properly (do not cross thread) and the ring must be hand tightened. Make sure that there is no liquid leakage on the discharge side. Connect the tubing to the suction side securely to prevent the entrance of outside air.



WARNING

When starting a newly installed or restarting a maintained pump, use caution and protective measures to guard against hazards associated with the possibility of leaks (e.g., spraying of pumped chemical under pressure, leakage of fluid, etc.). When possible, apply pressure slowly and discontinue operation immediately if leakage is observed.

*Lors du démarrage d'une pompe nouvellement installée ou du redémarrage d'une pompe entretenue, faites preuve de prudence et prenez des mesures de précaution pour vous prémunir contre les dangers associés à la possibilité de fuites (par exemple, pulvérisation de produit chimique pompé sous pression, fuite de liquide, etc.). Dans la mesure du possible, appliquez lentement la pression et interrompez immédiatement le fonctionnement en cas de fuite.*



WARNING

**Supplied Tubing is NOT static dissipative and may not meet location requirements.** Consult site Hazardous Location Expert for suitability for use.

*La tuyauterie fournie n'est PAS antistatique et peut ne pas répondre aux exigences du site. Consultez le spécialiste des emplacements dangereux du site pour déterminer la compatibilité.*



WARNING

Be careful to check that the voltage of the installation matches voltage indicated on the pump data label. Always be sure the pump is grounded. Do not use on circuits with heavy electrical equipment that would subject the PulsatronX to surge voltage that can cause failure of the electronic control circuit.

*Veillez à vérifier que la tension de l'installation correspond à la tension indiquée sur l'étiquette des données de la pompe. Assurez-vous toujours que la pompe est mise à la terre. N'utilisez pas sur des circuits avec un équipement électrique lourd qui soumettrait le PulsatronX à des surtensions pouvant entraîner une défaillance du circuit de commande électronique.*

Tampering with electrical devices can be potentially hazardous. Always place chemicals and pump installation well out of the reach of children.

Never repair or move the Product while operating. Always disconnect electrical power.



WARNING

**Always wear protective clothing (protective clothing, eye protection and gloves) when working on or near chemical metering pumps.**

*Portez toujours des vêtements de protection (vêtements de protection, lunettes de protection et gants) lorsque vous travaillez sur des pompes doseuses de produits chimiques ou à proximité.*

An air bleed valve is available for most models with tubing connections. Air purges should be performed when the pump chamber contains no fluid at the time of start-up. **Always, connect the return tubing to the air bleed valve to bypass fluid back to a storage tank or a suitable drain.**

For accurate volume output, the pump must be calibrated under typical operating conditions.

Chemicals used may be dangerous and should be used carefully and according to warnings on the label. Follow the directions given with each type of chemical. Do not assume chemicals are the same because they look alike. Always store chemicals in a safe location away from children and others. We cannot be responsible for the misuse of chemicals being fed by the pump. **Always have the material safety data sheet (SDS) available for any fluid being pumped.**



WARNING

**All pumps are pretested with water before shipment. When pumping a fluid that will react with water (e.g., sulfuric acid, polymers), first remove head and dry thoroughly. Valve seats, ball checks, gaskets, and the diaphragm should also be dried.**

*Toutes les pompes sont prétestées avec de l'eau avant l'expédition. Lorsque vous pompez un liquide qui réagit avec l'eau (par ex. acide sulfurique, polymères), retirez d'abord la tête et séchez-la soigneusement. Les sièges de soupape, les clapets à bille, les joints et la membrane doivent également être séchés.*

Valve cartridges are stamped to indicate fluid flow direction. **Always install valve cartridges so that markings read from top to bottom, with the arrow pointing in the direction of flow.**



When metering hazardous material, strictly use proper rigid pipe (DO NOT use plastic tubing) compliant to Hazardous Location and Chemical Compatibility requirements. Consult supplier for special adapters or valve assemblies.

*Lors du dosage de matières dangereuses, utilisez strictement un tuyau rigide approprié (n'utilisez PAS de tubes en plastique) conforme aux exigences relatives aux emplacements dangereux et à la compatibilité chimique. Consultez le fournisseur pour les adaptateurs spéciaux ou les ensembles de soupapes.*

Standard white discharge tubing is not recommended for installations exposed to direct sunlight. Consult supplier for special black tubing.



The Product is NOT rated to handle or meter flammable liquids or materials.

*Le produit n'est PAS conçu pour manipuler ou doser des liquides ou des matières inflammables.*

Factory will not be held responsible for improper installation of the Product. All cautions are to be read thoroughly prior to hookup and plumbing. For all installations, a professional electrician and plumber should be consulted. Always adhere to local codes and requirements.

When using pump with pressurized systems, make sure the pressure of the system does not exceed the maximum pressure rating on the pump data label. Be sure to depressurize system prior to hook up or disconnecting a metering pump.



Electronic power modules are equipped with automatic reset thermal overload devices and may reset unexpectedly.

*Les modules d'alimentation électroniques sont équipés de dispositifs de surcharge thermique à réinitialisation automatique et peuvent se réinitialiser de façon inattendue.*

## 1.5 FIRE SAFETY



**IN CASE OF ELECTRICAL FIRE, USE A CLASS C FIRE EXTINGUISHER. NEVER USE WATER TO EXTINGUISH A CLASS C FIRE.**

***EN CAS D'INCENDIE ÉLECTRIQUE, UTILISEZ UN EXTINCTEUR D'INCENDIE DE CLASSE C. N'UTILISEZ JAMAIS D'EAU POUR ÉTEINDRE UN INCENDIE DE CLASSE C.***

Class C fires involve electrical equipment, such as appliances, wiring, circuit breakers and outlets. Never use water to extinguish class C fires - the risk of electrical shock is far too great! Class C extinguishers do not have a numerical rating. The C classification means the extinguishing agent is non-conductive. Geometric symbol (blue circle)

## 1.6 LIABILITY EXCLUSION

Trained Professionals should install the Product. The Product should be Used/Maintained by individuals who have fully read and understand this manual.

Incorrect installation, misuse or insufficient or improper maintenance of the Product may cause severe damage to the Product itself and may pose a danger to persons or property. If you observe any apparent defects in or damage to the Product, or any irregularities or anomalies in its operation or function, you should stop using the Product immediately and contact Pulsafeeder or an authorized servicer. You should not attempt to repair the Product yourself or otherwise disassemble, modify, or tamper with it.



**INSTALLATION, OPEARATION AND MAINTENANCE OF THIS PRODUCT IN A MANNER INCONSISTENT WITH THE INSTRUCTIONS AND WARNINGS PROVIDED IN THIS MANUAL, OR ANY ATTEMPTS TO REPAIR, DISASSEMBLE, MODIFY OR TAMPER WITH THE PRODUCT BY ANYONE OTHER THAN AN AUTHORIZED SERVICER, COULD DAMAGE THE PRODUCT AND CAUSE SEVERE INJURY TO PERSONS OR PROPERTY.**

***L'INSTALLATION, L'UTILISATION ET L'ENTRETIEN DE CE PRODUIT D'UNE MANIÈRE INCOMPATIBLE AVEC LES INSTRUCTIONS ET LES AVERTISSEMENTS FOURNIS DANS CE MANUEL, ET TOUTE TENTATIVE DE RÉPARATION, DE DÉMONTAGE, DE MODIFICATION OU D'ALTÉRATION DU PRODUIT PAR UNE PERSONNE AUTRE QU'UN RÉPARATEUR AGRÉÉ POURRAIENT ENDOMMAGER LE PRODUIT, ET CAUSER DES BLESSURES GRAVES ET DES DÉGÂTS MATÉRIELS.***

In no event will Pulsafeeder, Inc. be liable for any loss, damage, or injury to the Product or to any person or property caused by:

1. Improper installation, operation, or maintenance of the Product by non-professional or inadequately trained operators.
2. Installation, operation, or maintenance of the Product that is not in strict compliance with all instructions and warnings contained in this manual.
3. Use of the Product that is not in compliance with the laws and regulations in the Country of use.
4. Lack of maintenance or improperly performed maintenance of the Product.
5. Use of non-original spare parts or incorrect parts for the Product.
6. Exceptional environmental events – acts of God, earthquakes, hurricanes, floods, force majeure, etc.



**DO NOT PERFORM ANY WORK ON THE PRODUCT WITH ELECTRICAL POWER CONNECTED. DO NOT OPERATE WITH THE CASE OPEN. DANGER OF ELECTRONIC SHOCK AND MECHANICAL PINCH HAZARD!**

*N'EFFECTUEZ AUCUNE INTERVENTION SUR LE PRODUIT LORSQUE L'ALIMENTATION ÉLECTRIQUE EST BRANCHÉE. N'UTILISEZ PAS LE SYSTÈME LORSQUE LE BOÎTIER EST OUVERT. RISQUE DE CHOC ÉLECTRONIQUE ET DE PINCEMENT MÉCANIQUE!*



**INSTALLATION AND REPAIRS SHOULD ONLY BE PERFORMED BY AUTHORIZED PERSONNEL! FOLLOW ALL SAFETY/ LOCAL LOCK-OUT, TAG-OUT PROCEDURES!**

*L'INSTALLATION ET LES RÉPARATIONS NE DOIVENT ÊTRE EFFECTUÉES QUE PAR UN PERSONNEL AUTORISÉ ! SUIVEZ TOUTES LES PROCÉDURES DE VERROUILLAGE/ÉTIQUETAGE LOCALES ET DE SÉCURITÉ!*



**REPAIR OF FLAME PATHS (E.G., MECHANICAL JOINTS IN ENCLOSURE) IS NOT INTENDED. ADDITION OF CONDUIT ENTRIES TO PULSATRONX CASE IS NOT INTENDED.**

*LA RÉPARATION DES CHEMINS DE FLAMME (PAR EXEMPLE, JOINTS MÉCANIQUES DANS L'ENCEINTE) N'EST PAS PRÉVUE. L'AJOUT D'ENTRÉES DE CONDUIT AU BOÎTIER PULSATRONX N'EST PAS PRÉVU.*

## 1.7 SUITABILITY TO SITE OF INSTALLATION

Essential safety requirements against explosion hazard in dangerous areas are regulated.



**IT IS THE CUSTOMER'S RESPONSIBILITY BEFORE INSTALLATION AND FOLLOWING START-UP TO VERIFY AND ENSURE THAT THE PRODUCT IS ACTUALLY SUITABLE FOR THE AREA CLASSIFICATION AND FOR THE CHARACTERISTICS OF FLAMMABLE SUBSTANCES PRESENT IN THE PLANT.**

*IL EST DE LA RESPONSABILITÉ DU CLIENT AVANT L'INSTALLATION ET APRÈS LE DÉMARRAGE DE VÉRIFIER ET DE S'ASSURER QUE LE PRODUIT EST EFFECTIVEMENT ADAPTÉ À LA CLASSIFICATION DE ZONE ET AUX CARACTÉRISTIQUES DES SUBSTANCES INFLAMMABLES PRÉSENTES DANS L'USINE.*

Upon Product receipt, verify that components have not received any damage due to transportation and are complete with every eventual accessory. In case anomalies or damages are discovered prior to installation, please contact PULSAFEEDER, INC. Technical Service.



**WHEN USED IN HAZARDOUS ENVIRONMENTS, ALL ENCLOSURE ENTRIES MUST BE SEALED WITH AN APPROPRIATELY RATED EX d SEALING DEVICE WITHIN 18 INCHES (45CM) OF THE ENCLOSURE ENTRY POINT.**

*EN CAS D'UTILISATION DANS DES ENVIRONNEMENTS DANGEREUX, TOUTES LES ENTRÉES DE L'ENCEINTE DOIVENT ÊTRE SCÉLLÉES À L'AIDE D'UN DISPOSITIF D'ÉTANCHÉITÉ EX d DE QUALITÉ APPROPRIÉE À MOINS DE 45 CM (18 PO) DU POINT D'ENTRÉE DE L'ENCEINTE.*



**THIS DEVICE INCLUDES NON-METALLIC COMPONENTS (E.G., ADJUSTMENT KNOBS, LABELS AND CORROSION RESISTANT COATINGS). USE ONLY A DAMP CLOTH TO REDUCE STATIC BUILDUP DURING CLEANING.**

*CET APPAREIL COMPREND DES COMPOSANTS NON MÉTALLIQUES (PAR EX., BOUTONS DE RÉGLAGE, ÉTIQUETTES ET REVÊTEMENTS RÉSISTANTS À LA CORROSION). UTILISEZ*

**UNIQUEMENT UN CHIFFON HUMIDE POUR RÉDUIRE L'ACCUMULATION D'ÉLECTRICITÉ STATIQUE PENDANT LE NETTOYAGE.**

**When so marked, the following standards apply to this product:**

<b>Marking</b>	<b>Rating *</b>	<b>UL Standard</b>
<b>Class I, Div. 1, Group C, D T5 Class I, Zone 1, Group IIB T5</b>	<b>Intermittent/Abnormal Hazard Explosion Proof Propane/Ethylene T5 = 100C</b>	<b>UL 1203</b>
<b>Safety Requirements – General Locations</b>	<b>Outdoor: Water Pumps</b>	<b>UL778</b>
<b>* Summary indicated - refer to standard for detail based on Marking.</b>		

## 1.8 NAMEPLATE AND MARKING

The PULSATRON X bears a standard rating nameplate on which it is possible to read, apart from functional data, all data required for universal identification.



Pumps carrying the WQA certified to NSF/ANSI 61 & 372 marks are so certified when they include the De-gassing or PVDF pump head. Contact [www.wqa.org](http://www.wqa.org) for more information.

## 1.9 TRANSPORT AND STORAGE

### 1.10 CONSIGNMENT RECEIPT AND UNPACKING

Check for completeness against the order and for any evidence of shipping damage. Do not use the Product if it is damaged. Shortages or damages should be reported immediately to the carrier and to the seller of the Product.

Check any crate, boxes or wrappings for any accessories or spare parts that may be packed separately with the Product or attached to side walls of the box or components.

Each PulsatronX has a unique serial number. Check that this number corresponds with that advised and always quote this number in correspondence as well as when ordering spare parts or further accessories.

### 1.11 HANDLING

Boxes, crates, pallets, or cartons should be unloaded using forklift vehicles.

### 1.12 LIFTING

The Product - PulsatronX, Accessories and Packaging weighs more than 25 kg (55 lb.). Fully trained personnel must carry out lifting in accordance with local regulations. Use of lifting aids (e.g., hoists) or team lifting/handling is required. When slings, ropes, and other lifting gear are employed they should be positioned where they cannot slip and where a balanced lift is obtained.

### 1.13 RECYCLING AND END OF PRODUCT LIFE

At the end of the service life of the Product or its parts, the relevant materials and parts should be recycled or disposed of using an environmentally acceptable method and local requirements. If the Product contains substances that are harmful to the environment, these should be removed and disposed of in accordance with all applicable current regulations. This also includes the liquids and/or gases that may be used in the "seal system" or other utilities.

Make sure that hazardous substances are disposed of safely and that the correct Personal Protective Equipment (PPE) is used. The safety specifications must be in accordance with the current regulations at all times.

## 2 STORAGE INSTRUCTIONS

### 2.1 SHORT TERM (0 - 12 MONTHS)

The PULSATRON X should be stored in a temperature and humidity-controlled environment. It is preferable to keep the temperature constant in the range of 32° to 104° Fahrenheit (0° to 40° Celsius). The relative humidity should be 0 to 90% non-condensing.



**THE Pulsatron X SHOULD BE STORED IN THE ORIGINAL SHIPPING CARTON IF POSSIBLE.**

### 2.2 LONG TERM (12 MONTHS OR MORE)

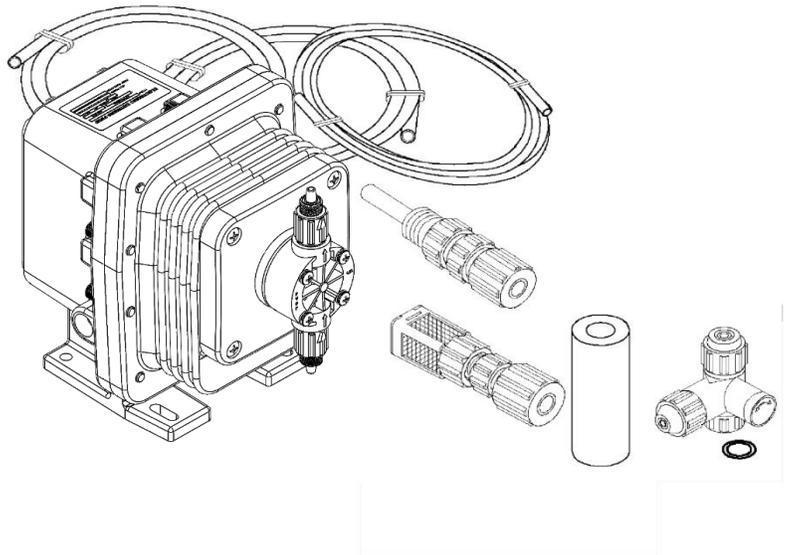
Storage of the PULSATRON X for periods of longer than twelve months is not recommended. If extended storage is unavoidable, the PULSATRON X should be stored in-doors in a controlled temperature/humidity environment.

## 3 UNPACKING THE PUMP

**Check the Product for completeness against the order and for any evidence of shipping damage. Do not use the Product if it is damaged. Shortages or damages should be reported immediately to the carrier and to the seller of the Product.**

The carton should Contain:

- Pulsatron X Metering Pump
- Clear Flexible Suction Tubing\*
- Stiff White Discharge Tubing\*
- Foot valve/Strainer Assembly\*
- Backpressure Injection Valve Assembly\*
- Manual
- Bleed Valve Assembly\*
- Strainer Weight\*



\*Items may or may not be included depending on model.

**Make sure that all items have been removed from the shipping carton before it is discarded.**

## 4 OPERATION

These installation, operation and maintenance instructions cover your Pulsatron X Electronic Metering Pump for Hazardous Locations. Refer to the pump data label to determine the actual model and ratings. Follow all instructions in this Manual. Failure to do so may result in serious bodily injuries, including death, property damage and/or damage to the Product.

### 4.1 PRINCIPLE OF OPERATION

Diaphragm metering pumps are used to dispense chemicals or fluids. This is achieved by an electromagnetic drive mechanism called a solenoid or Electric Power Module (EPM), which is connected to a diaphragm. When the EPM is energized by the control circuit it compresses the fluid in front of the diaphragm forcing it out of the Pump Head through the Discharge Check Valve. When the solenoid is de-energized, it returns the diaphragm to its starting position - pulling fluid into the pump head through the Suction Check Valve. The cycle repeats at a constant rate creating a desired flow.

The pump stroke rate is controlled by the circuit and is changed by turning the rate knob. The mechanical stroke length is controlled by the stroke length knob. Adjusting these controls allows the output of the pump to be varied.

## 4.2 MATERIALS OF CONSTRUCTION

The wetted materials (those parts that contact the solution being pumped) available for construction are FPP (glass filled polypropylene), PVC, CSPE, Viton, PTFE or FTF, 316 Stainless Steel, PVDF, Ceramic and Alloy C. These materials are very resistant to most chemicals. However, there are some chemicals, such as strong acids or organic solvents, which cause deterioration of some elastomer and plastic parts, such as the diaphragm, valve seats, or head.

Consult a Chemical Resistance Guide or Supplier for information on chemical compatibility.

Various manufacturers of plastics, elastomers and pumping equipment publish guidelines that aid in the selection of wetted materials for pumping commercially available chemicals and chemical compounds. Two factors must always be considered when using an elastomer or plastic part to pump chemicals:

- 1) **The temperature of service:** Higher temperatures increase the effect of chemicals on wetted materials. The increase varies with the material and the chemical being used. A material quite stable at room temperature might be affected at higher temperatures.
- 2) **Material choice:** Materials with similar properties may differ greatly from one another in performance when exposed to certain chemicals.

## 5 INSTALLATION

The metering pump should be in an area that allows convenient connections to both the chemical storage tank and the point of injection. The pump is water resistant and dust proof by construction and can be used outdoors, however, **do not operate submerged**. Avoid continuous temperatures below 32°F (0°C) and above 122°F (50°C). Failure to follow these instructions may result in damage to the pump.

### 5.1 LOCATION

Review the Safety section prior to installing the PULSATRON X. It contains vital information required to properly install and operate the PULSATRON X in Hazardous industrial environments.

Note all warning statements. The installation must comply with national, state, and local codes.



**AVOID LOCATIONS WHERE THE PULSATRON X WOULD BE SUBJECTED TO EXTREME COLD OR HEAT [LESS THAN 0°C (32°F) OR GREATER THAN 50°C (122°F)] AND/OR DIRECT SUNLIGHT. FAILURE TO OBSERVE THIS WARNING COULD DAMAGE THE PULSATRON X AND VOID ITS WARRANTY.**

***ÉVITEZ LES ENDROITS OÙ LE PULSATRON X SERAIT EXPOSÉ À UNE TEMPÉRATURE EXTRÊME [INFÉRIEURE À 0 °C (32 °F) OU SUPÉRIEURE À 50 °C (122 °F)] ET/OU À LA LUMIÈRE DIRECTE DU SOLEIL. LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENDOMMAGER LE PULSATRON X ET ANNULER SA GARANTIE.***

## 5.2 PUMP MOUNTING

Typical pump mounting arrangements are shown below.



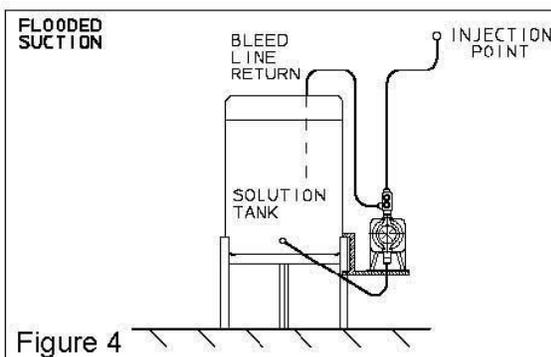
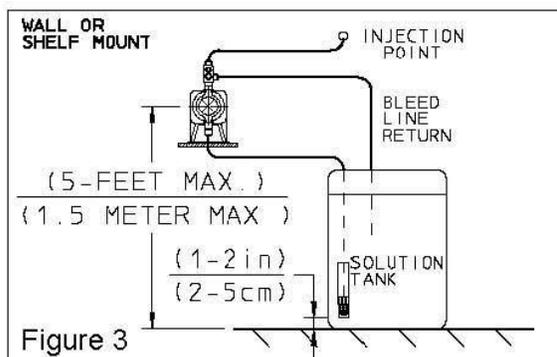
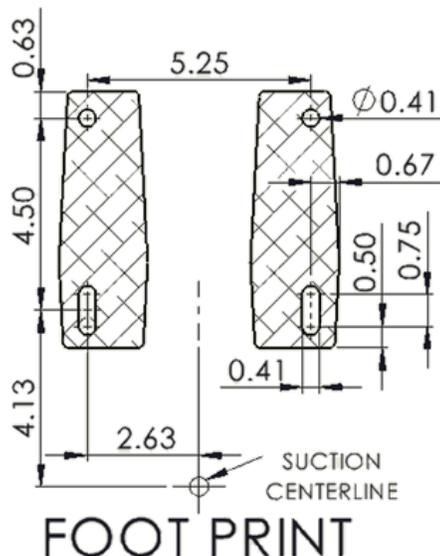
**Important: Injection point must be higher than the top of the solution supply tank to prohibit gravity feeding unless suitable backpressure is always present at the injection point. Installation of an anti-siphon valve will prohibit gravity feeding.**

For Wall or Shelf mounting, connect the suction tubing/pipe to suction valve of chemical pump. Suction valve is the lower valve. Tubing/pipe should be long enough so that the foot valve/strainer assembly hangs about 1-2 inches (2-5 cm) above the bottom of chemical tank. To keep chemical from being contaminated, the tank should have a cover.

Flooded Suction mounting - installing the pump at the base of the chemical storage tank - is the most trouble-free type of installation and is recommended for very low output requirements. Since the suction tubing/pipe is filled with chemical, priming is accomplished quickly and the chance of losing prime is reduced.

To mount the pump, drill four holes of 0.25" (6 mm) diameter in the shelf as shown in the dimension drawing. Attach pump securely using four 1/4-20 (M6) bolts and nuts.

USE AN ANTI-SIPHON VALVE IN THE DISCHARGE LINE whenever the fluid pressure in the discharge line is below atmospheric pressure. This can occur if the injection point is on the suction side of a water pump or against a "negative" head such as when feeding down into a well.



## 5.3 PUMP PREPARATION



**WARNING** Pumps are tested at the Factory with water. If the chemical to be pumped reacts with water (e.g., sulfuric acid, polymer) the pump head, diaphragm and valve seat should be removed and dried thoroughly.

*Les pompes sont testées en usine avec de l'eau. Si le produit chimique à pomper réagit avec l'eau (par exemple, acide sulfurique, polymère), la tête de pompe, la membrane et le siège de soupape doivent être retirés et séchés soigneusement.*

If pump is configured with a PVC gray, not black, pump head (the 7<sup>th</sup> position of model number is "V" or "W"), uniformly hand tighten the four head screws before use, 18-22 in-lbs. (3.2 -3.9 kg-cm). Periodically check and re-tighten, if necessary, after installation.

## 5.4 PIPING



**Supplied Tubing is NOT static dissipative and may not meet location requirements.** Consult site Hazardous Location Expert for suitability for use.

*La tuyauterie fournie n'est PAS antistatique et peut ne pas répondre aux exigences d'emplacement. Consultez le spécialiste des emplacements dangereux du site pour déterminer la compatibilité.*



**When metering hazardous material, strictly use proper rigid pipe (DO NOT use plastic tubing) compliant to Hazardous Location and Chemical Compatibility requirements.** Consult supplier for special adapters or valve assemblies.

*Lors du dosage de matières dangereuses, utilisez strictement un tuyau rigide approprié (n'utilisez PAS de tubes en plastique) conforme aux exigences relatives aux sites dangereux et à la compatibilité chimique. Consultez le fournisseur pour les adaptateurs spéciaux ou les ensembles de soupapes.*

Use provided tubing when appropriate for Location and compatible with fluid being pumped of specified size for connection. Otherwise use ridged pipe and fittings. Connect tubing/pipe securely to prevent leakage of chemical and the entrance of air. Since plastic nuts are used for some fittings, they should not be tightened excessively (i.e., hand tighten only). NPT suction and discharge valves must **NOT** be over tightened. Hold fitting in place while adding piping and fittings. NPT suction and discharge valves should only be tightened 25 to 35 in-lbs. (4.5-6.3 kg/cm).

If the air bleed valve assembly is being used, a return line (tubing) must be securely connected and routed back to the storage tank or safe fluid collection point.



**To avoid injury from chemicals, do not attempt to prime using a bleed valve without installing a return line.**

*Pour éviter les blessures causées par les produits chimiques, n'essayez pas d'amorcer à l'aide d'une vanne de purge sans installer une conduite de retour.*

Suction tubing/pipe should always be kept as short as possible.

To maintain metering performance, a backpressure/injection valve is recommended. The spring in the standard injection valve typically adds 17 - 20 PSI (1.17 - 1.38 BAR) to the line pressure, except for the H8 pump, which adds 8 - 10 PSI (.55 - .69 BAR). The injection valve must be installed in the discharge line. Best practice is to install the injection valve at the point of chemical injection.

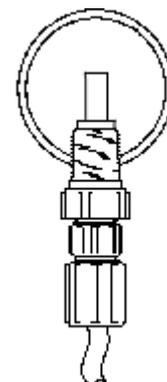
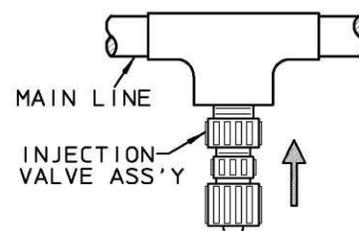
If the discharge tubing/pipe is going to be exposed to direct sunlight, UV resistant tube/pipe (typically black) should be used instead of the most standard white translucent tubing. Contact supplier to obtain UV resistant discharge tubing/pipe, if needed.

To prevent clogging or check valve malfunction always install a strainer assembly to the end of the suction tubing/pipe. This foot valve/strainer assembly should always be installed 1 to 2 inches (2-5 cm) above the bottom of the chemical tank. This will help prevent clogging the strainer with any solids that may settle on the tank bottom. The chemical tank and foot valve/strainer should be cleaned regularly to ensure continuous trouble-free operation. If the chemical being pumped regularly precipitates out of solution or does not dissolve easily or completely (e.g., calcium hydroxide), a mixer rated for the location should be used in the chemical tank. These are readily available in many motor configurations and mounting. Contact supplier to obtain a chemical tank and foot valve/strainer, if needed.

A flooded suction (tank liquid level always at a higher elevation than the pump) is recommended when pumping solutions such as sodium hypochlorite (NaOCl), hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), etc., which are likely to produce gas bubbles.

Maintaining a low liquid temperature will also help reduce gas bubbles.

Pipe corrosion can result if dilution at the injection point does not occur rapidly. To prevent pipe corrosion, install injection fitting so that the end is in the center



of the flow stream of the line being treated. Trim injector tip as required. See Figure above.



Extended injection assemblies are available for large water lines. Consult your supplier for more information.

NOTE

## 5.5 INTEGRITY OF THE ENCLOSURE

In normal operation there should be no unused entries. The power wiring should always be separated away from the signal wiring. The Enclosure Flange, Pump Head and Control panel should be secured with the supplied fasteners.



WARNING

**ADDITION OF CONDUIT ENTRIES TO PUMP CASE IS NOT INTENDED.**

*L'AJOUT D'ENTRÉES DE CONDUIT AU CARTER DE POMPE N'EST PAS PRÉVU.*



WARNING

**WHEN USED IN HAZARDOUS ENVIRONMENTS, ALL UN-USED CONDUIT ENTRIES MUST HAVE THE WIRES TRIMMED AND INSULATED ~4IN (10CM) FROM THE CONDUIT ENTRY (REMOVING EXCESS), TUCKED INSIDE THE ENCLOSURE. THEN THE CONUIT ENTRY MUST BE CLOSED WITH A CONDUIT ENTRY PLUG THAT HAS AN EQUIVALENT OR BETTER HAZARDOUS LOCATION RATING.**

*EN CAS D'UTILISATION DANS DES ENVIRONNEMENTS DANGEREUX, LES FILS DE TOUTES LES ENTRÉES DE CONDUIT NON UTILISÉES DOIVENT ÊTRE COUPÉS ET ISOLÉS À ~10 CM (4 PO) DE L'ENTRÉE DE CONDUIT (EN ÉLIMINANT L'EXCÈS), À L'INTÉRIEUR DE L'ENCEINTE. ENSUITE, L'ENTRÉE DE CONDUIT DOIT ÊTRE FERMÉE AVEC UN BOUCHON D'ENTRÉE DE CONDUIT QUI A UNE COTE POUR EMPLACEMENT DANGEREUX ÉQUIVALENTE OU SUPÉRIEURE.*

If questions arise about the conduit or cable glands during installation or servicing, contact Pulsafeeder field service or applications engineering for assistance.



WARNING

**WHEN USED IN HAZARDOUS ENVIRONMENTS, ALL CONDUIT ENCLOSURE CONNECTIONS MUST BE SEALED WITH AN APPROPRIATELY RATED FLAME-PROOF SEALING DEVICE WITHIN 18 INCHES (45CM) OF THE ENCLOSURE ENTRY POINT.**

*EN CAS D'UTILISATION DANS DES ENVIRONNEMENTS DANGEREUX, TOUTES LES CONNEXIONS DE CONDUIT DE L'ENCEINTE DOIVENT ÊTRE SCELLÉES À L'AIDE D'UN DISPOSITIF D'ÉTANCHÉITÉ IGNIFUGE APPROPRIÉ À MOINS DE 45 CM (18 PO) DU POINT D'ENTRÉE DE L'ENCEINTE.*

## 5.6 ELECTRICAL WIRING



TIP

**CONDUIT CONNECTIONS CAN CARRY FLUIDS AND VAPORS INTO THE PULSATRON X CAUSING DAMAGE AND VOID THE WARRANTY. CARE SHOULD BE TAKEN WHEN INSTALLING CONDUIT TO PROTECT AGAINST FLUID/VAPOR ENTRY. IN ACCORDANCE WITH ANY APPLICABLE CODES PROVIDE SEALED ENTRIES AND CONDUIT DRAINS NEAR THE POINT OF ENTRY AS REQUIRED.**



TIP

**VERIFY THE CORRECT SUPPLY VOLTAGE (115/230VAC) WITH THE NAMEPLATE. APPLYING HIGHER VOLTAGE WILL DAMAGE INTERNAL CIRCUIT.**



WARNING

**DO NOT CONNECT TO A CIRCUIT WITH AN AVAILABLE SHORT-CIRCUIT CURRENT OF MORE THAN 10K RMS SYMMETRICAL AMPS.**

*N'EFFECTUEZ PAS LA CONNEXION À UN CIRCUIT AVEC UN COURANT DE COURT-CIRCUIT DISPONIBLE DE PLUS DE 10 000 AMPÈRES SYMÉTRIQUES RMS.*



**WIRE SHOULD BE ROUTED IN A MANNER THAT MAINTAINS SEPARATION BETWEEN LINE AND EXTRA-LOW VOLTAGE (E.G., 4-20mA/PACE) CONDUCTORS.**

TIP



**APPLICABLE NATIONAL AND LOCAL ELECTRICAL CODES TAKE PRECEDENCE OVER RECOMMENDATIONS BELOW.**

WARNING

*LES CODES ÉLECTRIQUES NATIONAUX ET LOCAUX APPLICABLES ONT PRIORITÉ SUR LES RECOMMANDATIONS CI-DESSOUS.*

### 5.6.1 CODES AND REGULATIONS

All applicable codes and regulations should be adhered to in the installation and wiring of the PULSATRON X, especially if installed in a hazardous environment.



**THE SAFETY OF ANY SYSTEM INCORPORATING THE PUMP IS THE RESPONSIBILITY OF THE ASSEMBLER OF THE SYSTEM.**

WARNING

*LA SÉCURITÉ DE TOUT SYSTÈME INCORPORANT LA POMPE EST DE LA RESPONSABILITÉ DE L'ASSEMBLEUR DU SYSTÈME.*

### 5.6.2 POWER



**THE METERING PUMP SHOULD BE WIRED BY A QUALIFIED ELECTRICIAN TO AN ELECTRICAL SOURCE WHICH CONFORMS TO THE RATING ON THE PUMP NAMEPLATE. APPLYING HIGHER VOLTAGE THAN THE PUMP IS RATED FOR WILL DAMAGE THE INTERNAL CIRCUIT.**

WARNING

**POWER WIRING MUST HAVE A RATING OF AT LEAST 300 VAC(RMS) AND A TEMPERATURE OF AT LEAST 105 C.**

*LA POMPE DOSEUSE DOIT ÊTRE RACCORDÉE PAR UN ÉLECTRICIEN QUALIFIÉ À UNE SOURCE ÉLECTRIQUE CONFORME À LA VALEUR NOMINALE INDIQUÉE SUR LA PLAQUE SIGNALÉTIQUE DE LA POMPE. L'APPLICATION D'UNE TENSION SUPÉRIEURE À CELLE PRÉVUE POUR LA POMPE ENDOMMAGERA LE CIRCUIT INTERNE.*

*LE CÂBLAGE D'ALIMENTATION DOIT AVOIR UNE VALEUR NOMINALE D'AU MOINS 300 V C.A. (RMS) ET UNE TEMPÉRATURE D'AU MOINS 105 °C.*

Model	Full Load Amps (FLA)	
	115 VAC	230 VAC
PULSATRON X	1.5A	0.5A

The power connections are made to flying leads to the right of the control panel. The leads are labeled as follows: GROUND (GREEN), LINE (BROWN), and RETURN/LINE [230VAC] (BLUE).

**The pump electronic circuit includes protection from surge voltage by means of surge absorbing elements and high voltage semiconductors. Nevertheless, excessive/repeated surge voltage may cause failure. Therefore, the supply circuit should not be used in common with heavy electrical equipment that could generate high voltage spikes. If this is unavoidable, measures should be taken by (a) the installation of a surge-absorbing device (surge suppression to 2KV) to the circuit or, (b) the installation of a noise suppression transformer.**

### 5.6.3 SIGNAL INPUT WIRING

The Signal Input connections are made to flying leads to the left of the control panel. The leads are labeled as follows:

**XP\*\*E**

**XP\*\*M**

Signal Input includes standard External Stop and optional External Pace (XP\*\*E) or External 4-20mA analog signal (XP\*\*M) to control the stroking rate of the pump.

Both the External Stop and External Pace inputs require dry contact (e.g., mechanical switch in a water meter or an activated relay contact) or solid state (e.g., transistor) switched inputs. The pump provides the power for the circuit. Requirements:

**Function:** STOP (ON=Stop/OFF=Run)  
PACE (ON=Take one Stroke/OFF=Standby)  
**Type:** Dry Contact Input / Solid-state Switch  
**Isolation:** Isolated from Earth Ground, not independent  
Multiple pumps cannot share common closure  
**On Condition:** Closed - <100 ohms across input / > 500 microamperes  
**Off condition:** Open - >1M ohms across input / < 200 microamperes  
**Max Switching Rate:** 2Hz (120 cycles/minute)

The 4-20mA Input controls the stroking rate of the pump. Input Requirements (comment):

**Function:** 4-20mA Input  
(4mA ~ 0% Stroke Rate, 20mA ~ 100% Stroke Rate – Not user calibratable)  
**Type:** Analog Signal from External Source  
(No internal loop power provided by pump)  
**Isolation:** Isolated from Earth Ground, not independent  
**Loop Impedance:** 124Ohms

## 5.6.4 GROUNDING

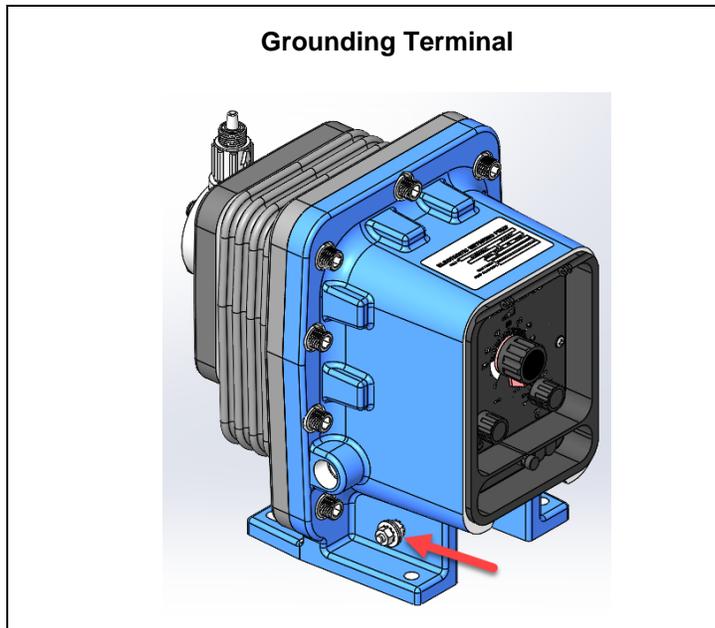


**APPLICABLE NATIONAL AND LOCAL ELECTRICAL CODES TAKE PRECEDENCE OVER RECOMMENDATIONS**

**WARNING**

*LES CODES ÉLECTRIQUES NATIONAUX ET LOCAUX APPLICABLES ONT PRIORITÉ SUR LES RECOMMANDATIONS.*

The primary incoming power electrical ground should be attached to the GREEN ground lead as defined in section Power Wiring. In addition, one external ground location is provided for use where grounding requirements exceed single point. The ground point is located outside the enclosure near the foot to the left of the control panel (as shown below):



**WARNING: Risk of Electrical Shock.** To reduce the risk of electrical shock, confirm the pump is connected only to a properly grounded circuit.

## 5.6.5 INSTALLATION GUIDELINES FOR EMC COMPLIANCE

- 1) The enclosure should not be opened.
- 2) Metal conduit should be used for signal inputs (e.g., 4-20mA/Pace).
- 3) Use external ground to properly ground enclosure.
- 4) Ensure Power mains are properly filtered for isolation from line transients, lightning strikes, or other electrical noise sources.



**FAILURE TO OBSERVE THE GUIDELINES ABOVE MAY LEAD TO ERRATIC AND POSSIBLY UNSAFE OPERATING CONDITIONS.**

*LE NON-RESPECT DES DIRECTIVES CI-DESSUS PEUT ENTRAÎNER DES CONDITIONS DE FONCTIONNEMENT IRRÉGULIÈRES ET POTENTIELLEMENT DANGEREUSES.*

## 6 OPERATION AND STARTUP

### 6.1 PUMP CONTROL PANEL

The pump control panel includes 3 basic controls – Operating Mode, Stroke Rate Setting and Stroke Length Setting.

### 6.2 OPERATING MODE

The operating mode is set by a 3-position switch in the lower left corner of the control Panel.



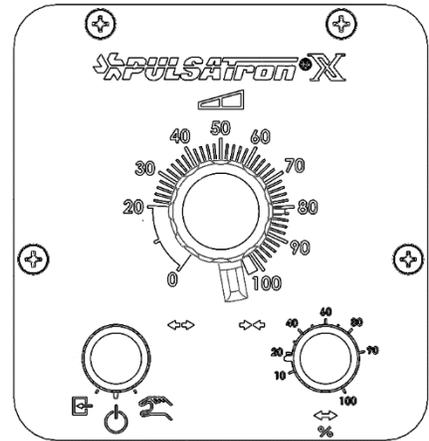
Stand-By (Center Position): In this mode the pump has power but will not cycle to pump.



Hand Control (Right Position): In this mode the pump will cycle (pump) with the settings made on the control panel.



Remote Control (Left Position): In this mode the pump will cycle (pump) with the incoming signal (dependent on configuration – Pace or 4-20mA signal).



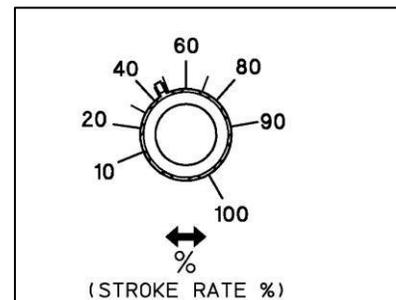
### 6.3 STROKE RATE ADJUSTMENT



The Stroke Rate Setting is in the lower right of the control panel. The Stroke Rate can be controlled from 10 to 100% (12 to 125 strokes per minute) by adjusting the control knob. Rotate the knob clockwise for more flow.

The setting can be made when the pump is in Standby or Manual (Hand) mode.

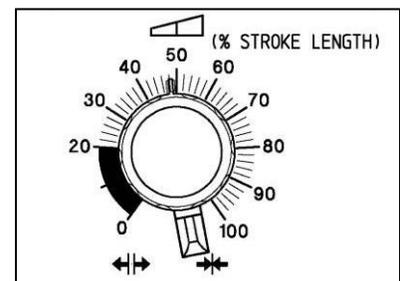
The setting will be ignored when the pump is in Remote Control (Pace or 4-20mA).



### 6.4 STROKE LENGTH ADJUSTMENT

Stroke length can be set between 0 and 100% of the diaphragm displacement. It should be controlled within 20 to 100% for practical use.

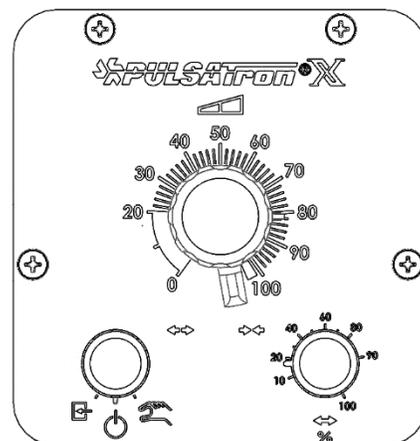
Stroke length can be set by means of the stroke length adjusting knob while the pump is in operation. Do not turn the knob while the pump is stopped.



## 6.5 PRE-STARTUP CHECKLIST

Before powering the pump for the first time:

- Put on PPE in accordance with chemical in use Safety Data Sheet.
- Check Lockout/Tagout State.
- Confirm incoming power matches Pump Nameplate.
- Confirm power and signal connections are complete.
- Confirm conduit installation is complete and compliant to code (Hazardous Location Seal Fittings/Plugs/etc.)
- Confirm tubing/piping fittings are complete and tight.
- Check pump head bolts are tight (Grey PVC head only).
- Confirm bleed valve is in OFF position and bleed routed to supply/collection tank.
- Open upstream valves – check for leaks and correct if necessary.
- Open supply isolation valve to pump suction – check for leaks and correct if necessary.
- Open downstream valves and set to open – check for leaks and correct if necessary.
- Open discharge isolation valve – check for leaks and correct if necessary.
- Set Pump Mechanical Stroke Length Control (Center Knob – Full Clockwise) to 100%.
- Set Pump Rate Control to 100% (Bottom Right Knob – Full Clockwise).
- Set Pump Control to Standby (Bottom Left Knob – Center Position).
- Remove Lockout Tagout.



→ PUMP IS READY TO START

## 6.6 PRIMING

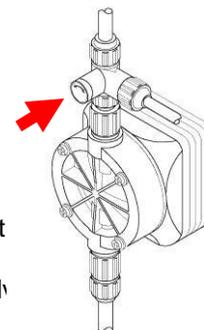
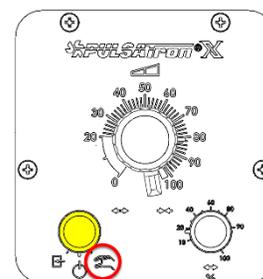


**WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GLASSES AT ALL TIMES WHILE WORKING ON OR AROUND A CHEMICAL METERING PUMP INSTALLATION. FAILURE TO DO SO MAY RESULT IN SERIOUS BODILY HARM, INCLUDING DEATH.**

*PORTEZ DES VÊTEMENTS DE PROTECTION, DES GANTS ET DES LUNETTES DE SÉCURITÉ EN TOUT TEMPS LORSQUE VOUS TRAVAILLEZ SUR UNE POMPE DOSEUSE DE PRODUITS CHIMIQUES OU À PROXIMITÉ. LE NON-RESPECT DE CETTE CONSIGNE PEUT ENTRAÎNER DES BLESSURES GRAVES, VOIRE MORTELLES.*

Procedure:

- 1) Complete the checklist items in the previous section.
- 2) Turn on the power to the pump.
- 3) Prepare for the pump to run and possibly discharge fluid.
- 4) Move the Pump Control Knob to Hand (bottom Left Knob – Hand Symbol). The pump will start to make a clicking sound as the Power Module cycles. The sound may change as fluid enters the pump and it begins to build pressure.
- 5) If the discharge line is connected directly to a pressurized system, it may be necessary to bleed the air from the line and pump-head to allow the pump to generate pressure.
  - a. Open the bleed valve to release air from the suction tubing/pipe and Pump Head by turning the bleed valve control knob Counter-Clockwise.
  - b. Run with valve open until a solid stream of fluid comes out of the bypass tubing/pipe with no air bubbles.
  - c. Close air bleed valve by turning adjustment screw clockwise.
- 6) Chemical should reach the pump head after a few minutes of operation. If not:
  - a. Move the Pump control knob to Stand-by (bottom Left Knob – Center Position).
  - b. Remove power from the pump – lockout/tagout.
  - c. Isolate the pump by turning off both the suction and discharge isolation valve system.
  - d. Remove the discharge fitting.
  - e. While wearing the proper PPE obtain a sample of the chemical being fed to the metering pump in a proper container.



- f. Moisten the discharge valve area (ball check and valve seats) with a few drops of **chemical being fed to the metering pump**.
  - g. Replace the discharge fitting.
  - h. Clean any spilled chemical from the Pump Head, Valves, Piping and Pump Housing.
  - i. Open the suction and discharge isolation valves.
  - j. Restore power to the pump – remove lockout/tagout.
  - k. Move the Pump control knob to Hand (bottom left knob – Hand Position).
  - l. Return to Step #5 of this procedure.
- 7) If the pump still will not prime, refer to Section 10.0, Troubleshooting, of these instructions.
  - 8) Adjust back pressure device if in use.
  - 9) Adjust the pump flow to the desired rate (see Capacity Control section). Always check the calibration of the pump after start-up. It is best to calibrate the pump under your typical use conditions.

## 6.7 CAPACITY CONTROL

Capacity can be controlled by means of the stroke length adjusting knob and/or stroke rate adjusting knob. Control knobs provide coarse adjustment and are not calibrated - use a calibration column to improve accuracy. Contact your pump supplier for proper calibration equipment.

## 6.8 MANUAL FLOW RATE SETTING

Proper set points for Stroke Length and Stroke Rate should be determined after consideration of the pump and characteristics of the fluid. The following procedure is recommended for maximum pump performance.



**Note: The closer the stroke length is to 100%, the better the pump performance will be.**

TIP

### Procedure:

- 1) Follow the procedure in the Priming Section of this document.
- 2) Set the Stroke Length and Stroke Rate to 100%.
- 3) Adjust back pressure valve (if available) to the desired discharge pressure.
- 4) Check the flow rate using the Calibration Column to get the Maximum Flow at the operating pressure for the system.
  - a. Fill the calibration column to align with a mark near its top.
  - b. While the pump is running turn the valve at the base of the calibration column to draw from the column. Start a timer.
  - c. Switch the valve and stop the timer at a convenient point on either the calibration column (e.g., low mark on the column) or timer (e.g., 60 seconds).
  - d. Read the difference between the 2 marks on the calibration column and divide by the measured time to obtain the Maximum flow rate.
- 5) Divide the desired flow by the pump Maximum Flow to obtain a percentage of maximum flow (e.g., 15 gpd desired flow divided 31 gpd pump rated flow =  $15/31 = 0.48 = 48\%$ ).
- 6) Set the stroke length to 100%.
- 7) Adjust the Stroke Rate to a value 5% less than the percentage calculated in step #5 (e.g., 48% - 5% = 43%).
- 8) Measure the capacity (e.g., with a calibration column).
  - a. If the measured capacity is less than the required value, increase the stroke rate. Repeat.
  - b. If the measured capacity is more than the required value decrease the stroke rate. Repeat.
  - c. If the measured capacity is correct, continue to next step.
- 9) Measure the capacity again.
  - a. If you feel the Stroking rate is too low, decrease the Stroke Length by 10% (e.g., change from 100% to 90%) and add 10% to the Stroke Rate (e.g., 48% + 10% = 58%). Repeat to step #8.
  - b. If the measured capacity is correct, continue to next step.
- 10) Measure the capacity and make sure that the required value is obtained. If not, repeat to step #6.

### Example

Selected Model	=	XPK4
Set Stroke Length	=	100%
Maximum Flow*	=	31 gallons per day (GPD at Rated Pressure)
Desired Flow	=	15 GPD
Set Stroke Rate	=	15/31 = 0.48 = 48%

\* Check these values by measurement - Output capacity is higher when feeding against less than rated pressure.

## 6.9 OPERATION BY EXTERNAL INPUT SIGNAL

The pump can be controlled by two types of input signals – 1) Digital Run/Stop, 2) Digital Pace or Analog 4-20mA (configuration dependent). All are fully isolated from AC input and from earth ground. The Input Signal Connections are made to Flying Leads that are labeled. See the Wiring Section of this document for further information.

## 6.10 STOP FUNCTION (ALL MODELS)

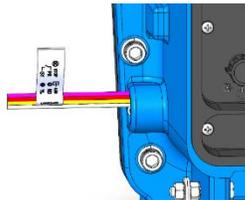
Operation of the pump can be stopped by an external signal input. When the 2-wire input circuit is closed, the operation of the pump is stopped. The stop function overrides both the manual settings and external input (i.e., Pace or 4-20mA).



**Operation of more than one pump from the same contact closure will damage the pump circuits. When such operation is required, the pump circuits must be electrically isolated from one another by means of a multi-contact control relay or similar means.**

The input signal must be in the form of closure of a mechanical relay or other mechanical switching device, or solid-state relay or other solid-state switching device. Voltage signals are prohibited. The switching resistance of either mechanical or solid-state devices must be 100 ohms or below when ON and 1 megohm or above when OFF. If any type of solid-state device is employed, it must be installed with the proper polarity, if required for the device; and leakage current must not exceed 200 microamperes to prevent false triggering in the OFF state.

The stop function is commonly used in conjunction with a tank float switch. The float switch contacts are normally open but when the tank level falls past a certain point the contacts close and the pump stops.



See Signal Input Wiring Section for more information.

## 6.11 EXTERNAL PACING FUNCTION (PUMP MODEL STRING XP \_\_ E).

A Pacing signal, like from a flow meter, can be used to control the pump's stroke rate. When the input signal line is connected and the REMOTE CONTROL/STAND-BY/MANUAL(HAND) switch is in the REMOTE-CONTROL position and the Pace Input wires are closed (e.g., shorted or switched), the pump makes one discharge/suction stroke. If the input is switched continuously the pump will stroke up to its maximum rate (125 strokes/minute).



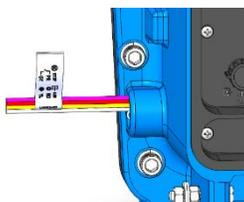
**Operation of more than one pump from the same contact closure will damage the pump circuits. When such operation is required, the pump circuits must be electrically isolated from one another by means of a multi-contact control relay or similar means.**

The external signal input is debounced by the pump circuit – it must be closed for more than 10mS to be recognized. The pump will not stroke in response to a spurious or erratic switching that is greater than its maximum strokes/minute. If the external signal rate exceeds its maximum strokes/minute, the pump will stroke at half the external signal rate to prevent overdosing and to protect the pump from overheating.

The input signal must be in the form of closure of a mechanical relay, mechanical switching device (e.g., float switch), or of a solid-state switching device. Voltage signals are prohibited. The switching resistance of either mechanical or solid-state devices must be 100 ohms or below when ON and 1 megohm or above when OFF.

If any type of solid-state device is employed, it must be installed with proper polarity, if required for the device; and leakage current must not exceed 200 microamperes to prevent false triggering in the OFF state.

See the Signal Input Wiring Section for more information.



## 6.12 4-20mA DC INPUT FUNCTION (PUMP MODEL STRING XP \_\_ M)

The pump's stroke rate can also be controlled by a 4-20 mA DC signal connected to the wires marked [4-20 mA]. For the 4-20 mA input to have any effect on the pump output rate, the REMOTE CONTROL/STAND-BY/MANUAL(HAND) switch must be in the REMOTE-CONTROL position.

The 4-20 mA input signal affects the pump's output as per the graph below. Operation below 5.6mA (10%) is not recommended.

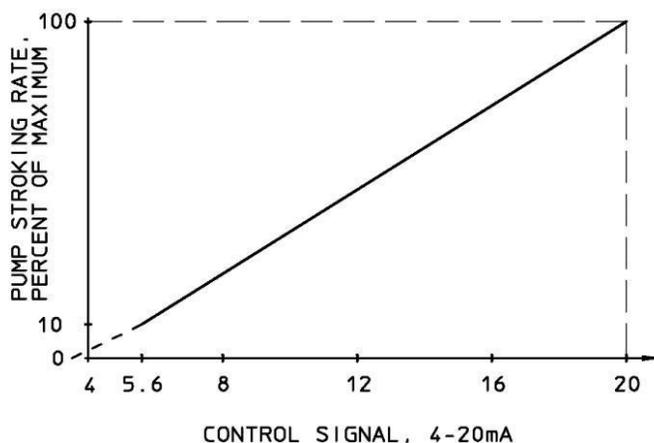


Figure 13

Wire polarity is:

RED = Positive

YELLOW = Common

Wrong polarity can result in excess flow.

The Signal input impedance is 124 ohms.

The input cannot be calibrated at the Pump – please adjust the signal driving device (e.g., PLC).



## 7 MAINTENANCE

**CAUTION** Before performing any maintenance or repairs on chemical metering pumps, be sure to disconnect all electrical connections, ensure that all pressure valves are shut off and pressure in the pump and lines has been bled off.

Always wear protective clothing, gloves and safety glasses when performing any maintenance or repairs on chemical metering pumps.



**ALL MAINTENANCE WORK MUST BE CARRIED OUT ONLY WHEN THE PRODUCT AND CONNECTED EQUIPMENT IS STOPPED AND DISCONNECTED FROM MAINS SUPPLY (INCLUDING AUXILIARY CIRCUITS). MAINTAINING ORIGINAL CHARACTERISTICS OVER TIME MUST BE ENSURED BY AN EFFICIENT MAINTENANCE AND INSPECTION PLAN, DEVELOPED AND MANAGED BY QUALIFIED**

**TECHNICIANS, TAKING INTO ACCOUNT THE SERVICE AND THE ACTUAL ENVIRONMENTAL CONDITIONS IN WHICH IT OPERATES.**

*TOUS LES TRAVAUX DE MAINTENANCE DOIVENT ÊTRE EFFECTUÉS UNIQUEMENT LORSQUE LE PRODUIT ET L'ÉQUIPEMENT CONNECTÉ SONT ARRÊTÉS ET DÉBRANCHÉS DE L'ALIMENTATION SECTEUR (Y COMPRIS LES CIRCUITS AUXILIAIRES). LE MAINTIEN DES CARACTÉRISTIQUES ORIGINALES DANS LE TEMPS DOIT ÊTRE ASSURÉ PAR UN PLAN DE MAINTENANCE ET D'INSPECTION EFFICACE, ÉLABORÉ ET GÉRÉ PAR DES TECHNICIENS QUALIFIÉS, EN TENANT COMPTE DES CONDITIONS DE SERVICE ET ENVIRONNEMENTALES RÉELLES DANS LESQUELLES IL OPÈRE.*



**THIS DEVICE INCLUDES NON-METALLIC COMPONENTS (E.G., ADJUSTMENT KNOBS, LABELS AND CORROSION RESISTANT COATINGS). USE ONLY A DAMP CLOTH TO REDUCE STATIC BUILDUP DURING CLEANING.**

*CET APPAREIL COMPREND DES COMPOSANTS NON MÉTALLIQUES (PAR EX., BOUTONS DE RÉGLAGE, ÉTIQUETTES ET REVÊTEMENTS RÉSISTANTS À LA CORROSION). UTILISEZ UNIQUEMENT UN CHIFFON HUMIDE POUR RÉDUIRE L'ACCUMULATION D'ÉLECTRICITÉ STATIQUE PENDANT LE NETTOYAGE.*



**REPAIR OF FLAMEPATHS IS NOT INTENDED.**

*LA RÉPARATION DES CHEMINS DE FLAMME N'EST PAS PRÉVUE.*

## 7.1 OPERATING PRECAUTIONS

Qualified personnel must perform all operations.

**Work on the Product should only be performed with safety supervisor authorization, after having verified that:**

- 1) Power has been disconnected at the source (follow your local lockout tag out procedures).
- 2) Verify that power supplied is disconnected, and no parts are energized, including any auxiliaries.
- 3) Ensure that any risk of accidental restart has been excluded.
- 4) Consult Manufacturers Operating Manual(s) for instructions on minimizing risk due to pressurized or chemically dangerous conditions within the system.
- 5) With Product switched off and disconnected, that the ON-OFF valves on the suction and discharge pipelines are closed.
- 6) The product has been cleaned, when operating in environments exposed to aggressive chemicals.
- 7) Maintenance personnel shall refer to the Installation & Wiring and Startup Instructions of this manual for safe return to service after repair.

Since the Product is designed and intended for operation in industrial areas, additional measures must be adopted and assured by the person responsible for the installation, should more restrictive safety conditions be required.

## 7.2 CLEANING AND DECONTAMINATION



*The PULSATRON X enclosure may be cleaned with water and mild detergent using a damp (never dry) rag. Decontamination shall occur when the PULSATRON X is exposed to a release of process chemicals. Follow the SDS of the chemical for clean-up in the event of a spill.*

## 7.3 USER REPLACEABLE PARTS FOR THE PULSATRON X

The enclosure and all parts that mount to it (including related hardware) or pass through it are not serviceable. Please contact the factory for repair or replacement.

Wet-end parts (replacement diaphragm, valves, and gaskets) are included in a Keep-On Pumping kit (KOPkit). You can find the part number on the Pump Nameplate.

## 7.4 ROUTINE MAINTENANCE

Routinely check the physical operating condition of the pump. Look for the presence of any abnormal noise, excessive vibration, low flow, and pressure output or elevated temperatures [when running constantly at maximum stroke rate, the pump housing temperature can be up to 160°F (70°C)].

For optimum performance, cartridge valves should be changed every 6-12 months. Depending on the application, more frequent changes may be required. Actual operating experience is the best guide in this situation.

Repeated short-term deterioration of valve seats and balls usually indicates a need to review the suitability of wetted materials selected for the application. Contact the supplier for guidance.

Check for leaks around fitting or because of deteriorating tubing e.g., when standard white translucent discharge tubing is exposed to direct sunlight. Take appropriate action to correct leak by tightening fittings or replacing components.

Keep the pump free of dirt and debris as this provides insulation and can lead to excessive pump temperatures. Use only a damp rag for cleaning to avoid static buildup/discharge.

If the pump has been out of service for a month or longer, clear the pump head valve assemblies by pumping fresh water for approximately 30 minutes. If the pump does not operate normally after this "purging run," replace cartridge valve assemblies.

## 8 DISASSEMBLY / RE-ASSEMBLY

### 8.1 DIAPHRAGM REMOVAL

Flush pump head and valve assemblies out by running pump with water or other suitable neutralizing solution. Wash outside of pump if chemical has dripped on pump. Set stroke length knob of pump to 0% and unplug pump.

Depressurize the system and disconnect tubing or piping from the pump. Remove the four pump head screws and then remove the pump head assembly.

Remove the diaphragm by grasping it at the outer edge and turning it counterclockwise until it unscrews from the electronic power module (EPM). Do not lose the deflector plate or diaphragm shims which are behind the diaphragm, they are needed for re-assembly. Note shim quantity may be from 0 to 2.

Inspect diaphragm, if it is intended to be used again look for indications of the PTFE face being overstretched, (localized white areas) or the elastomer on the back of the diaphragm being worn. Excessive amounts of either condition require diaphragm replacement.

### 8.2 DIAPHRAGM REPLACEMENT

When replacing the diaphragm, it is always a good idea to replace the valve cartridges and other worn parts. A kit is available from your supplier with all parts necessary to completely rebuild your pump's wet end. All your supplier needs to know is the "KOPkit No." on your pump's data label to supply this kit.

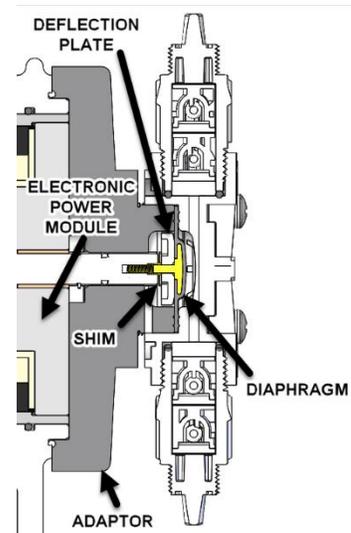
Set pump stroke length at 50% and unplug the pump.

If you kept the shims from the original diaphragm or know the original quantity, you can avoid the next step for shimming the diaphragm.

Apply grease to areas of the diaphragm that contact the deflection plate.

Slide the diaphragm deflection plate onto the back of the diaphragm stud, radius side towards the diaphragm. Next slide two shims onto the diaphragm threaded stud and screw the diaphragm into the EPM unit. Refer to Figure this page. Turn diaphragm clockwise until deflection plate and shims are tight against solenoid shaft and the diaphragm stops turning. If there is a gap between the adaptor and diaphragm, repeat the procedure removing the shim each time until the diaphragm just touches the adaptor or is slightly recessed.

If not already done, adjust stroke length to 50%. Place the pump head onto the adaptor with valve flow arrows pointing up and install and tighten pump head screws. Tighten screws until pump head pulls up against adaptor.





### Adjust stroke length only when pump is running!

Adjust stroke length back to 100% for easier priming and place pump back into service.

## 8.3 VALVE REPLACEMENT

Flush pump to clean any chemical from pump head.

Disconnect power from the pump, release system pressure, and disconnect tubing or piping.

Unscrew valve cartridges and discard. Also remove O-rings down inside the pump head.

Install new valve cartridges with stamped letters reading from top to bottom, and the arrow pointing in the direction of flow. Hand-tighten only, do not use wrenches or pliers.

Reconnect tubing or piping and reinstall the pump. Check for leaks around newly installed fittings.

## 8.4 FUSE REPLACEMENT

All wire terminations of PULSATRON X must be made externally using flying leads and appropriate sealing fittings – opening the enclosure is only required under the abnormal case of Fuse Failure and Replacement.

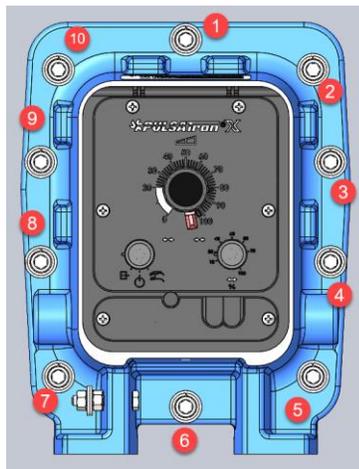
**OPENING OF THE ENCLOSURE FOR MAINTENANCE (I.E., FUSE REPLACEMENT) MUST BE DONE ONLY IF THE AREA IS KNOWN TO BE NON-HAZARDOUS. CARE MUST BE TAKEN TO ENSURE PROPER RE-INSTALLATION OF THE COVER. REVIEW THIS ENTIRE MANUAL THOROUGHLY BEFORE PROCEEDING.**



*L'OUVERTURE DE L'ENCEINTE POUR MAINTENANCE (REPLACEMENT DES FUSIBLES, PAR EXEMPLE) NE DOIT ÊTRE EFFECTUÉE QUE SI LA ZONE N'EST PAS DANGEREUSE. VEILLENZ À RÉINSTALLER CORRECTEMENT LE COUVERCLE. LISEZ ATTENTIVEMENT CE MANUEL AVANT DE CONTINUER.*

### Cover Removal

1. Disconnect power at the source (follow your local Lock-Out-Tag-Out procedures). **Assure area is Non-Hazardous.**
2. Remove Suction and Discharge Valves. Set Stroke Length setting (center knob) to 100%.
3. Remove (10) 3/8-16 x 1-1/2 (PN J1109) Socket Head Cap Screws retaining enclosure halves.



- Carefully tip Power Module End (Black) towards Pump Head exposing fuse.



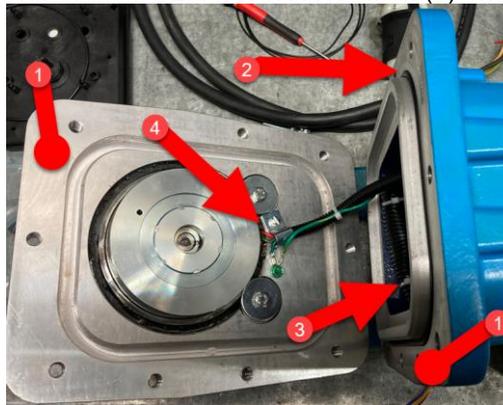
- Locate fuse in protective loom:



- Cut cable ties to expose fuse assembly. Replace with 2A 240VAC Sealed Slo-Blow Fuse (Pulsafeeder PN: L9707300-000 [Little Fuse PN: 0225002.HXP]).
- Replace covering and retaining Cable ties.

### Cover Re-installation

- Disconnect power at the source (follow your local Lock-out-Tag-out procedures).
- Verify that the flange of the cover of the PULSATRON X is clean (1) and O-ring is in place (2).



- Inspect wiring to assure it is neat and secured away from the flange joint (3) and Power Module plunger (4).
- Pivot the Power Module assembly (left above) towards the Electronic Control assembly (right above) and engage the groove-tang. Assure no wires are caught or pinched.
- Re-install the (10) 3/8-16 Socket Head Cap Screws retaining enclosure halves. Torque evenly to 20 ft-lb.
- Check flange with 0.0015in (0.04mm) feeler gage. It should not enter the flange by more than 0.125in (3mm) at any location. If necessary, remove bolts and repeat to step 2. If the requirement cannot be met, then the unit must be returned to the factory for repair/replacement.
- When the enclosure is properly closed, the PULSATRON X is ready for operation. Remove Lock-out-Tag-out protection and restore power. See the Electrical Wiring section for further details.

## 9 TROUBLESHOOTING

Issue	Probable Cause	Remedy
Failure to Pump	<ol style="list-style-type: none"> <li>1. Leak in suction side of pump</li> <li>2. Valve seats not sealing</li> <li>3. Low setting on pump</li> <li>4. Low suction level</li> <li>5. Diaphragm ruptured</li> <li>6. Pump head cracked or broken</li> <li>7. Pump head contains air or chlorine gas</li> <li>8. Breakdown or disconnection of wiring</li> <li>9. Voltage drop</li> <li>10. Malfunction of electronic control board</li> </ol>	<ol style="list-style-type: none"> <li>1. Examine suction tubing. If worn at the end, cut approximately one inch (2.5cm) off and reconnect</li> <li>2. Clean valve seats if dirty or replace with alternate material if deterioration is noted</li> <li>3. When pumping against pressure, the dial should be set above 20% capacity for a reliable feed rate</li> <li>4. Solution must be above foot valve strainer</li> <li>5. Replace diaphragm as shown in 6.0 Maintenance Section. Check for pressure above rated maximum at the injection point. NOTE: Chemical incompatibility with diaphragm material can cause diaphragm rupture and leakage around the pump head</li> <li>6. Replace pump head as shown in 6.0 Maintenance Section. Make sure fitting are hand tight only. Using pliers and wrench can crack pump head. Also, chemical incompatibility can cause cracking and subsequent leakage.</li> <li>7. Bleed pump head, see Start-up and Operation section</li> <li>8. Connect wiring properly. Check fuse or circuit breaker</li> <li>9. Take measures after investigation of cause</li> <li>10. Contact supplier</li> </ol>
Loss of Chemical Residual	<ol style="list-style-type: none"> <li>1. Pump setting to low</li> <li>2. Scale at injection point</li> <li>3. Solution container allowed to run dry</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust to higher setting (pump must be operating to adjust stroke length knob)</li> <li>2. Clean injection parts with 8% muriatic acid or undiluted vinegar (also, see Maintenance Section)</li> <li>3. Refill the tank with solution and prime (see Start-up and Operation Section)</li> </ol>
Too Much Chemical	<ol style="list-style-type: none"> <li>1. Pump setting too high</li> <li>2. Chemical in solution tank too rich</li> <li>3. Siphoning of chemical into well or main line</li> </ol>	<ol style="list-style-type: none"> <li>1. Lower pump setting (pump must be operating to adjust stroke length knob)</li> <li>2. Dilute chemical solution. NOTE: For chemical that reacts with water, it may be necessary to purchase a more dilute grade of chemical direct from chemical supplier</li> <li>3. Test for suction or vacuum at the injection point. If suction exists, install an anti-siphon valve</li> </ol>

Issue	Probable Cause	Remedy
<b>Leakage at Tubing Connections</b>	<ol style="list-style-type: none"> <li>1. Worn tube ends</li> <li>2. Chemical attack</li> </ol>	<ol style="list-style-type: none"> <li>1. Cut off end of tubing approximately one inch (2.5cm) and reconnect</li> <li>2. Consult your seller for alternate material</li> </ol>
<b>Leakage at Fitting</b>	<ol style="list-style-type: none"> <li>1. Loose fittings</li> <li>2. Broken or twisted gasket</li> <li>3. Chemical attack</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten hand tight. Replace gasket if hand tightening does not stop leakage</li> <li>2. Check gaskets and replace if broken or damaged</li> <li>3. Consult your pump supplier for alternate material</li> </ol>
<b>Pump Loses Prime</b>	<ol style="list-style-type: none"> <li>1. Dirty check valve</li> <li>2. Ball checks not seating or not sealing properly</li> <li>3. Solution container allowed to run dry</li> <li>4. Chemical outgassing</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove and replace or clean off any scale or sediment</li> <li>2. Check seat and ball checks for chips, clean gently. If deformity or deterioration is noted, replace part with proper material. Resulting crystals can hold check valves open, therefore, the valves must be disassembled and cleaned</li> <li>3. Refill the tank with solution and prime. See Start-up and Operation Section</li> <li>4. Bleed gas, use flooded suction and maintain chemical at room temperature (approximately 70°F) to minimize outgassing</li> </ol>
<b>Pump will not Prime</b>	<ol style="list-style-type: none"> <li>1. Too much pressure at discharge</li> <li>2. Check valves not sealing</li> <li>3. Output dials not set at maximum</li> <li>4. Suction lift height too much. Maximum 5ft (1.5m)</li> <li>5. Pump equipped with spring loaded high viscosity valves</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn off all pressure valves, relieve system pressure then loosen outlet tubing connection at discharge point. Remove discharge valve cartridge. Dampen ball check and valve seats with a few drops of solution. Set pump dial to maximum rate. When pump is primed, reconnect all tubing connections</li> <li>2. Disassemble, clean and check for deterioration, damage or swelling. Reassemble and wet the valve assembly, then prime. See Operation and Start-Up Section.</li> <li>3. Always prime pump with output dial set at maximum rated capacity.</li> <li>4. Decrease suction lift or pull vacuum on pump discharge until pump is primed</li> <li>5. Loosen discharge valve to aid in priming, take necessary safety precautions for spills or apply vacuum to pump discharge</li> </ol>

## **10 POLICIES AND PROCEDURES**

### **10.1 MANUFACTURER'S LIMITED PRODUCT WARRANTY**

Pulsafeeder, Inc. warrants the PulsatronX Diaphragm Metering Pump to be free of defects in material or workmanship for twenty-four (24) months from the date of original purchase, or twelve (12) months from date of installation, whichever comes first (the "Warranty Period"), when used in accordance with the instructions set forth in this manual, and subject to the terms, conditions and limitations set forth herein. During the Warranty Period, in the event of a defect covered by the terms of this Warranty, Pulsafeeder, Inc. will, in its sole discretion either: (i) repair the PulsatronX or any defective part using either new or refurbished parts that meet the functional specifications for the original PulsatronX, (ii) replace the PulsatronX or any defective part with a new or refurbished version of the same model or, if not available, the nearest available model, or (iii) refund the purchase price of the PulsatronX or defective part.

This Warranty does not cover claims asserted by anyone other than the original purchaser of the PulsatronX from Pulsafeeder, Inc. or an authorized retailer; claims made outside the Warranty Period (even if the defect occurred during the Warranty Period); or claims made without a dated purchase order or other proof of purchase. It also does not include any costs of installation or removal of the PulsatronX or any defective part, and in no event shall Pulsafeeder, Inc.'s liability exceed the original purchase price of the Product or the part.

This Warranty does not cover defects, damages or loss caused by: (i) accident (e.g., accidental physical impact, submersion or exposure to extreme temperatures); (ii) theft or loss of the PulsatronX or any of its components or accessories; (iii) abuse, misuse, neglect or failure to observe any and all instructions contained in the instruction manual furnished at the time of original purchase; (iv) acts of nature such as fire, flood, water damage, lightning, power surges (or similar electrical abnormalities), earthquake or tornado; (v) interference from other equipment or incompatibility with other products; (vi) battery leakage or malfunction; or (vii) alteration, modification, disassembly, tampering or repair by anyone other than Pulsafeeder, Inc. or an authorized service provider. It also does not cover normal wear and tear, normal depletion of consumable parts, or cosmetic damage that does not impact the functionality of the Product, such as scratches or stains, or damage that occurs during shipment or handling.

This Warranty does not cover any wear items and supplied accessories or any other products that may be used with the PulsatronX. It does not cover the Product's packaging or packing materials. And it does not cover installation, removal, setup, adjustment, maintenance, or related cleaning.

For instructions on how to obtain service under this Limited Warranty, please contact Pulsafeeder, Inc. at 27101 Airport Rd., Punta Gorda, FL, USA, (941)575-3800, ppgpulsaspo.cs@idexcorp.com. Our customer service team may ask you some questions to determine whether your Product is eligible for warranty service. If we determine that your Product exhibits a covered defect, we will, at our option, repair or replace the Product and ship it to you at our cost or refund you the purchase price of the PulsatronX. If your Product does not exhibit a covered defect, or if it is otherwise ineligible for service under this Warranty, we will make reasonable efforts to return the Product to you at your cost upon request, but we make no guarantees and accept no liability for ineligible Product shipped to us.

If we elect to repair or replace the PulsatronX, the repaired or replaced Product shall continue to be covered under this Warranty for the remaining portion of the original Warranty Period, or for three (3) months from the date the repaired or replaced Product is delivered to you, whichever is longer. Any replaced parts (if the Product is repaired), or the original Product (if a replacement or refund is provided), will not be returned to you and will become the property of Pulsafeeder, Inc.

#### **LIMITATION OF LIABILITY**

TO THE MAXIMUM EXTENT PERMITTED BY LAW, THE WARRANTY AND REMEDIES SET FORTH HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND REMEDIES. ANY AND ALL STATUTORY OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE WARRANTY PERIOD SET FORTH ABOVE. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY MAY LAST, SO THE FOREGOING LIMITATION MAY NOT APPLY TO YOU. NO AGENT OF PULSAFEEDER, INC. IS AUTHORIZED TO MAKE ANY WARRANTY OTHER THAN THOSE SET FORTH HEREIN.

TO THE MAXIMUM EXTENT PERMITTED BY LAW, PULSAFEEDER, INC. SHALL HAVE NO LIABILITY WHATSOEVER FOR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOST PROFITS OR COMMERCIAL LOSS, LOSS OF GOODWILL OR BUSINESS INTERRUPTION, WHETHER RESULTING FROM BREACH OF WARRANTY, TORT, CONTRACT OR ANY OTHER LEGAL OR EQUITABLE THEORY, AND THE ENTIRE LIABILITY OF PULSAFEEDER, INC. SHALL BE LIMITED TO THE ORIGINAL PURCHASE PRICE PAID FOR THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THESE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

## 10.2 RETURNS

Contact our Customer Service Department by mail phone or email:

Pulsafeeder, Inc. at 27101 Airport Rd., Punta Gorda, FL, USA  
(941)575-3800  
[ppgpulsaspo.cs@idexcorp.com](mailto:ppgpulsaspo.cs@idexcorp.com)

We will issue a Return Authorization (RA) number for all returns. The following information will be required:

1. Billing and a ship-to address.
2. Model and serial number.
3. Contact name and phone number.
4. Reason for return.
5. Purchase order (where applicable).

**The RA number must appear on the outside of the shipping carton.** All material must be returned freight prepaid. All merchandise must be properly packaged and free of any corrosive, toxic or otherwise hazardous chemical. All items returned must reference the Return Authorization number.

## 10.3 CREDITS

No Product will be accepted beyond six months after date of shipment from the factory. Only unused and undamaged Product will be accepted for return to stock. All credits are based on acceptance of materials as new and unused by our inspection personnel. A restocking fee will apply. All Product returned for credit must have a RA number and be returned freight prepaid.





**USA**

Pulsafeeder, Inc.  
27101 Airport Rd.  
Punta Gorda, FL 33982 USA  
(941) 575-3800  
[www.pulsa.com](http://www.pulsa.com)